



Species of Concern

NOAA National Marine Fisheries Service

Humphead Wrasse

Cheilinus undulatus



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KEY INFORMATION

Areas of Concern

Indo-Pacific region, from the Red Sea to the Tuamotus, north to the Ryukyus, including China and Chinese Taipei, east to Wake Island, south to New Caledonia, throughout Micronesia; includes the U.S. territories of Guam, American Samoa, the Northern Marianas, Howland, Baker, Jarvis and Kingman Islands and Palmyra Atoll (Figure 1).

Year Identified as “Species of Concern”
2004

Factors for Decline

- Fishing
- Night spearfishing
- Lack of coordinated international management
- Illegal, unregulated, unreported fishing
- Habitat loss

Conservation Designations

IUCN: Endangered
CITES: Appendix II

Brief Species Description:

The humphead wrasse is the largest living member of the family Labridae, with a maximum size exceeding 6 feet (2 m) and 420 lbs (190 kg) (Sadovy et al. 2003). Humphead wrasses are slow growing and long-lived, with delayed reproduction and, consequently, low replenishment rates. Small juveniles are black and white and larger juveniles become pale greenish with a vertically elongate black spot on each scale tending to form bars; two black lines extend posteriorly from each eye in all color phases, clearly distinguishing this species; dorsal profile of head in juveniles is straight to level of eye. Adults are olive green to blue-green with a spindle-shaped dark bar on each scale; the slightly oblique black lines extend posteriorly from the lower half of the eye, often with two more from eye to rear part of upper lip; adults develop a prominent hump on the forehead and thick lips. Males may attain 6 feet (2 m) in length although females rarely exceed about 3 feet (1 m) (Choat et al. 2006). Individuals become sexually mature at 5 to 7 years and can live at least 30 years (Choat et al. 2006). Its generation time is expected to be in excess of 10 years and the rate of intrinsic population increase is likely to be low. The species is a protogynous hermaphrodite (with female-to-male sex change) which may make it more vulnerable to overharvest than species that do not change sex. They primarily eat mollusks, fishes, sea urchins, crustaceans, and other invertebrates and are one of the few predators of toxic animals such as sea hares, boxfishes and crown-of-thorns starfish (Myers 1991).

C. undulatus is extremely patchily distributed with adults confined to steep outer reef slopes, channel slopes, and lagoon reefs in water 3 to 330 feet (1-100 m) deep. Adults appear to be sedentary over a given patch of reef according to multiple accounts by divers that return repeatedly to the same spots and report seeing the same individuals. Periodically adults move to a local spawning aggregation site where they concentrate to spawn at certain times of the year. This species actively selects branching hard and soft corals and seagrasses at settlement. Juveniles tend to prefer a more cryptic existence in areas of dense branching corals, bushy macroalgae or seagrasses, while larger individuals and adults prefer to occupy limited home ranges in more open habitat on the edges of reefs, channels, and reef passes (Donaldson and Sadovy



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2001, Tupper 2007). In Guam and Palau, newly settled humphead wrasse settled preferentially into mixed branching coral and bushy macroalgae substrate (Tupper 2007). Moreover, growth rates and survival were significantly higher in these habitats than in other habitats, including seagrass and coral rubble. Thus, humphead wrasse in Micronesia showed a clear preference for specific nursery habitats. Overall, humphead wrasse density is strongly correlated with the percentage of hard bottom or coral cover, while fish size is inversely proportional to coral cover (i.e., the smallest fishes were abundant in areas with high live coral) (Sadovy et al. 2003). The species is most often observed in solitary male-female pairs, or groups of two to seven individuals (Donaldson 1995, Sadovy et al. 2003).

Accounts of reproduction in the field reveal that, depending on location, this species spawns between several and all months of the year, in small or large groups (Russell 2004). Spawning coincides with certain phases of the tidal cycle, and groups of spawning fish can form daily, at a range of different reef types. Spawning areas and aggregated adults have been noted regularly along specific sections of reef, sometimes associated with no obvious topographical features, sometimes close to the shelf edge on outer reefs, or adjacent to exposed reef passes near fairly steep drop-offs, or on mid-shelf reefs. The species is evidently a daily spawner that probably does not migrate far to its spawning site(s), spawning for extended periods each year, i.e., it is a 'resident' spawner (Domeier and Colin 1997). Probable spawning aggregations have also been noted on Australia's Great Barrier Reef (GBR), Fiji, New Caledonia, and in the Solomon Islands (Russell 2004). On the GBR, aggregations of up to 10 large males and 20 to 50 smaller fish (35–95 cm TL) were noted. GBR aggregations from the Ribbon Reefs and north of Jewell Reef, once noted to include hundreds of fish, are no longer known at the same sites (Johannes and Squire 1988).

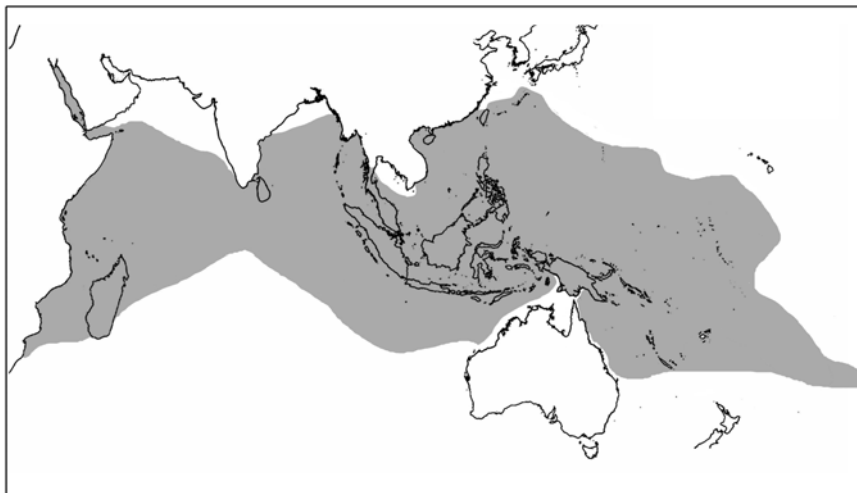


Figure 1: Range of the humphead wrasse (Y. Sadovy). Hoover (1993) reported a specimen found in a Honolulu, Hawaii fish market in 1967. Two additional sightings in Hawaii have been reliably reported recently (Randall 2007). These are probably strays.

Rationale for “Species of Concern” Listing:

Demographic and Genetic Diversity Concerns:

It is believed to be uncommon to rare wherever it occurs, and natural densities are evidently never high even in preferred habitats. Survey results throughout the species' range in preferred habitats have shown adult densities of humphead wrasse in unfished or lightly fished areas at 1 to 10 animals per 5,000 square meters of reef (1 to 8 per acre, Donaldson and Sadovy 2001). Once an economically important species in Guam, it is now rarely seen on reefs there, and is infrequently



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reported on inshore survey catch results. In Wake Island, a special permit is required for fishing. In this lightly fished habitat, the species is abundant between 15 and 100 feet (5 to 30 m) depth. A survey of the area estimated at least 13-27 large fish per 10,000 m² in a high visibility area; while juveniles (<30 cm TL) were abundant everywhere (Lobel and Lobel 2000).

Surveys conducted on extensive research cruises by the NOAA Pacific Islands Fisheries Science Center's Coral Reef Ecosystem Division (CRED) in 2002, 2004, and 2006, found humphead wrasse to be present, but uncommon, around all islands of American Samoa (Swains Island, Rose Atoll, Tutuila, Ofu-Olo, and Tau), and large individuals to be rare. The species was also observed to be uncommon to rare on analogous CRED surveys conducted during these same years at Howland and Baker Islands, in the U.S. Phoenix Islands, and at Jarvis Island, Palmyra Atoll, and Kingman Reef, in the U.S. Line Islands (unpublished data, PIFSC-CRED). CRED surveys also found the humphead wrasse to be similarly uncommon-rare in the Marianas Archipelago, while relatively most common at Wake Atoll.

Factors for Decline:

Threats include: 1) intensive and species-specific removal in the live reef food fish trade; 2) spearfishing at night with SCUBA gear; 3) destructive fishing techniques, including sodium cyanide and dynamite; 4) habitat loss and degradation; 5) juveniles being taken from the wild and raised or "cultured" in floating net cages until saleable size; 6) a developing export market for juvenile humphead wrasse for the marine aquarium trade; 7) lack of coordinated, consistent national and regional management; and 8) illegal, unregulated, or unreported (IUU) fisheries.

The most serious threat to this species is overharvest, both commercial and subsistence. This species is long-lived, and since it is a protogynous hermaphrodite (female to male sex change) (Sadovy et al. 2003) is particularly vulnerable to fishing pressure. Moreover, being one of the largest of all reef fishes, they have few natural predators which means that fishing mortality may rapidly exceed natural mortality, possibly accounting for the rapid declines noted once fishing intensifies.

The species' essential coral reef habitat is seriously threatened by human activity throughout the Indo-Pacific region and juvenile habitat is being degraded by coral bleaching, sedimentation, and other disturbances. Destructive fishing practices, such as sodium cyanide use which stuns animals for capture and incidentally kills living coral, have been well documented and are spreading in the Indo-Pacific region (Barber and Pratt 1998, Jones and Hoegh-Guldberg 1999, Burke et al. 2002, Bryant et al. 1998, Johannes and Riepen 1995). Larger fish are difficult to catch any other way, other than by nighttime capture.

Humphead wrasse are being cultured or "farmed" to supply a growing international demand. However, culture techniques currently undertaken may actually pose a threat to wild populations in certain circumstances. Typically, small fish are taken from the wild and raised in floating net cages until reaching saleable size. This activity is commonly referred to as 'culture', or 'cultivation', but is essentially a capture



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fishery of juveniles and their maintenance in captivity to legal or marketable size (Sadovy et al. 2003). Moreover, there is a developing export market for juvenile humphead wrasse for the marine aquarium trade (Y. Sadovy, personal observation). The impact on the age structure and reproductive potential of wild populations depends on the size of fish taken and their likelihood of reaching adulthood and reproduction (Sadovy and Pet 1998). Early life history mortality is unknown for this species, and thus surplus production at small size classes cannot be determined. The controlling factors in their sequential sex change are not well understood, but selective removal of particular size classes of fish could significantly impact a population's reproductive potential through excessive targeting of males (large fish), or juveniles likely to survive to adulthood.

Status Reviews/Research Underway:

In August 2006, NMFS Pacific Islands Regional Office (PIRO) Protected Resources Division held its first Species of Concern workshop in Honolulu, Hawaii, for species in the Pacific Islands Region. The purpose of the workshop was to have researchers and resource managers share their knowledge and research in order to compile updated information on the species, their habitat, threats, research, and conservation ideas. After the open discussion on the species, threats were prioritized, recovery actions/conservation efforts addressing each threat were identified, and data and research needs for each species were listed. These efforts will contribute to the development of a NMFS PIRO conservation action plan for the species. This conservation action plan will be a living document that will aid NMFS PIRO to identify, prioritize, and fund conservation and research projects in the U.S. for each Pacific Islands Region Species of Concern over the coming years.

Data Deficiencies:

Needs include: 1) continue to survey in all U.S. areas of occurrence; 2) determine the extent of the species' home range (how far individuals normally travel); 3) identify individual populations using DNA sampling; 4) characterize and determine locations of spawning aggregations and their usage patterns; 5) collect creel, artisanal, and commercial fisheries data throughout the U.S. range; 6) determine if this species makes sound; and 7) if it makes sound, understand when and why the sound is made and use acoustic monitoring to assess population parameters such as presence/absence, spatial distribution, and temporal patterns of occurrence.

Existing Protections and Conservation

Actions:

It is listed as Management Unit Species (Currently Harvested Coral Reef Taxa) in the Coral Reef Ecosystems Fishery Management Plan of the Western Pacific Regional Fishery Management Council. MUSs are those species that are managed under an FMP or a Fishery Ecosystem Plan (FEP). In fisheries management, MUS typically include those species that are caught in quantities sufficient to warrant management or specific monitoring.



Photo credit: Jim Maragos, USFWS. Juvenile, Naha Airport Aquarium, Okinawa, Japan.



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American Samoa (U.S.) banned the use of spear-fishing with SCUBA gear in 2001 after declines in grouper and wrasse populations coincided with the advent of commercial harvest in 1994. When this fishery moved to neighboring (independent) Samoa, two districts comprising 20 villages immediately imposed an identical ban and are advocating a national prohibition (Birkeland and Friedlander 2001). In 2003 the Government of Samoa banned spearfishing with SCUBA gear except for scientific purposes, however, a ministerial intervention was subsequently made to allow spearfishers then participating in the fishery to continue their activities using SCUBA gear (Gillett and Moy 2006). All U.S. Pacific territories require licenses to export marine fishery products, and American Samoa requires that export ventures are locally owned. The waters surrounding Wake Island, Johnston Atoll, and Palmyra Atoll from the shoreline out to 50 fathoms are protected as a low-use MPA, which means that any person of the United States fishing for, taking, or retaining coral reef ecosystem management unit species (CRE MUS) must have a special permit. Also, CRE MUS may not be taken by means of spearfishing with SCUBA gear at night (from 6 p.m. to 6 a.m.) in the U.S. EEZ waters around Wake Island, Johnston Atoll, or Palmyra Atoll. Wake Island is also fully protected by the U.S. Department of Defense. In 1996 Palau developed conservation areas for the species and over time juveniles have begun to make a comeback. The management of these species in Palau also includes a total ban on export and a minimum size limit of 25 inches total length. Also, during the summer of 2006 the Government of Palau placed a temporary total moratorium on fishing for this species. As of April 2007, this moratorium is still in effect. Australia instituted total protection in May 1998 because stocks were determined to be insufficient and susceptible to overfishing. In December 2003, Australia prohibited all take and possession of humphead wrasse, other than for limited educational purposes and public display. In Guangzhou province, southern mainland China, permits are required for the sale of this species; Indonesia allows fishing only for research, mariculture, and licensed artisanal fishing; the Maldives instituted an export ban in 1995; Papua New Guinea prohibits export of fish ≤ 2 feet (65 cm) TL; and Niue has banned all fishing for this species.

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